

REMARKS

Claims 1-5 and 12-16 are pending in the application.

Claims 1-5 are rejected under 35 U.S.C. § 112.

Claims 6-16 are rejected under 35 U.S.C. 103(a).

Claims 6-11 are cancelled.

No new matter is added.

Applicant requests reconsideration and allowance of the claims in light of the amendments made above and in view of the following remarks.

Claim Rejections - 35 U.S.C. § 112

Claims 1-5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement allegedly because there is no support in Applicant's original disclosure for a metallic layer attached to a back of a chip without an intervening adhesive layer. Applicant respectfully traverses this rejection.

In the "Response to Arguments" section, the present Office Action appears to assert that there is no support in the specification as originally filed for a metallic layer attached to a back of a chip without an intervening adhesive layer therebetween because FIG. 4 of the specification "fails to show explicitly what is behind" that which is actually shown. Thus, it appears that the present rejection is based upon a finding that the specification as originally filed does not literally describe "a metallic layer formed on a back surface of the semiconductor chip without an intervening layer therebetween" as recited in claim 1. Applicant respectfully submits, however, that the subject matter of the claim need not be described literally in order for the disclosure to satisfy the description requirement. All that is required is that newly added claim limitations be supported in the specification through express, implicit, or inherent disclosure. See M.P.E.P. § 2163. Thus, whenever the issue arises, the fundamental factual inquiry is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, applicant was in possession of the invention as claimed. See M.P.E.P. § 2163.02.

Page 6, line 29 to page 7, line 6 of the specification as originally filed states:

A metallic layer 115 is formed on the back surface 110b of the wafer (step 192). ...As shown in FIG. 9, the back surface 110b is lapped with a lapping device 180. Because the silicon oxide layer is

naturally formed on the back surface of the wafer 110, if the metallic layer is formed on the back surface of the wafer 110 without any treatment, adhesion between the back surface of the wafer 110 and the metallic layer 115 can be undesirably weak.

For this reason, in this embodiment, the back surface 110b is lapped with the lapping device 180. ...As shown in FIG. 10, the metallic layer 115 is formed on the lapped back surface 110b of the wafer 110.

As shown above, the specification teaches wherein adhesion between the metallic layer 115 and the back surface 110b of wafer 110 having a silicon oxide layer naturally formed thereon can be “undesirably weak.” Accordingly, Applicant submits that the specification conveys with reasonable clarity to one of ordinary skill in the art that an adhesive quality between the silicon oxide layer formed on the back surface 110b of wafer 110 and the metallic layer 115, as opposed to an adhesive quality between the silicon oxide layer formed on the back surface 110b of wafer 110 and an undisclosed intervening layer bonded to the metallic layer 115, is “undesirably weak.” It is in this context that the specification states why the back surface 110b of wafer 110 should be treated (e.g., lapped) and the metallic layer 115 should be formed on the lapped back surface 110b. Accordingly, Applicant respectfully submits that the specification conveys with reasonable clarity to one of ordinary skill in the art that the an adhesive quality between the lapped back surface 110b of wafer 110 and the metallic layer 115, as opposed to an adhesive quality between the lapped back surface 110b of wafer 110 and an undisclosed intervening layer bonded to the metallic layer 115, is not “undesirably weak” as a result of the lapping.

In view of the analysis above, and by virtue of the absence of any written description supporting an intervening layer between the back surface 110b of wafer 110 and the metallic layer 115, Applicant respectfully submits that the specification as originally filed conveys with reasonable clarity to one of ordinary skill in the art that the metallic layer 115 is formed on the back surface 110b of wafer 110 without an intervening layer. Accordingly, Applicant submits that the specification as originally filed supports the element “a semiconductor chip having a metallic layer formed on a back surface of the semiconductor chip without an adhesive layer therebetween” as recited in claim 1. For at least these reasons, Applicant requests withdrawal of the present rejection.

As set forth at M.P.E.P. § 2143.03, Office personnel must complete a patentability determination under all the relevant statutory provisions of title 35 of the U.S. Code, regardless of a determination of whether the written description requirement of 35 U.S.C. § 112, first paragraph is satisfied. Indeed, as set forth at M.P.E.P. § 2143.03, even limitations which are allegedly not supported in the specification as originally filed must be considered when determining whether a claimed invention is patentable in view of prior art. As established above, claim 1 is fully supported by the specification as originally filed. As such, and in the absence of any prior art rejections applied against claim 1, Applicant respectfully submits that claims 1-5 are in condition for allowance.

Claim Rejections - 35 U.S.C. § 103

Claims 6, 9 and 10 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. Patent No. 5,936,758 issued to Fisher, et al. (hereinafter "Fisher") in view of U.S. Patent No. 4,554,573 issued to Yamamoto, et al. (hereinafter "Yamamoto").

Applicant submits that this rejection is moot in view of the cancellation of claims 6, 9 and 10.

Claims 6-10, 12-14 and 16 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Fisher in view of U.S. Patent No. 5,241,133 issued to Mullen, III et al. (hereinafter "Mullen") and U.S. Patent No. 6,882,042 issued to Zhao, et al. (hereinafter "Zhao").

Applicant submits that the rejection of claims 6-10 is moot in view of the cancellation of claims 6-10. Accordingly, Applicant respectfully traverses the rejection of claims 12-14 and 16.

Regarding the rejection of claim 12, the Office Action asserts that it would have been obvious to "modify the package of Fisher by incorporating a copper metallic layer between the chip and adhesive in order to reduce stress as taught by Mullen." Applicant respectfully disagrees.

For example, FIG. 6 of Mullen shows a printed circuit board 62, a stiffener 60 bonded to the printed circuit board 62, and a chip 64 bonded to the stiffener 60. At column 4, lines 41-46, Mullen discloses wherein "[t]he metal stiffener [60] acts to reduce the mechanical stress imparted by the mismatch between the thermal expansion coefficients of the printed circuit board [62] and the semiconductor chip [64]" thereby allowing "larger integrated circuit chips ... [to] be

used in the plastic pad array chip carrier package.” Thus, the “stress” reduced by the stiffener 60 of Mullen is stress that is imparted by a mismatch between the thermal expansion coefficients of the printed circuit board 62 and the semiconductor chip 64. The base 46 of Fisher, however, is a molded ceramic material (see Fisher, column 5, lines 65-66). Moreover, at column 2, lines 25-32, Mullen discloses that “ceramic substrates are employed to accommodate thermal expansion mismatch between the substrate and the silicon chip.” In view of the teachings of Fisher and Mullen, considered in their entirety, Applicant respectfully submits it would not be obvious to modify Fisher using Mullen as proposed because the “stress” that the stiffener 60 of Mullen reduces is not present between the chip 12 and ceramic base 46 of Fisher. Thus, Applicant respectfully submits neither Fisher nor Mullen suggest the desirability of their combination as proposed and, therefore, do not render claim 6 obvious. See M.P.E.P. § 2143.01(I). Claim 12 recites elements similar to those found in claim 6. Accordingly, arguments presented above with respect to the rejection of claim 6 are also applicable to the rejection of claim 12.

Lastly, claim 12 recites, among other elements “a semiconductor chip ... having formed directly on a back surface thereof a metallic layer.” Applicants respectfully submit that neither Fisher nor Mullen teach or suggest at least this element as recited in claim 12. At most, the stiffener 60 of Mullen is “on,” as opposed to “directly on,” the back surface of a semiconductor chip 64. While claims are broadly interpreted during examination, M.P.E.P. § 2111 states that the claims must be given their broadest *reasonable* interpretation *consistent with the interpretation that those skilled in the art would reach*. Applicant respectfully submits that the phrase “directly on” is commonly understood by those of ordinary skill in the art to mean, for example, “in direct contact with.” Thus, to use the example given in the “Response to Arguments” section of the present Office Action, a chip attached to a substrate by an intervening adhesive is “on” the substrate but is only “directly on” on the intervening adhesive. Applicants respectfully submit that any an interpretation to the contrary frustrates the very meaning and common usage of the phrase “directly on.” Absent any evidence that one of ordinary skill in the art would interpret “directly on” and “on” to be equivalent, Applicants respectfully submit that neither Fisher nor Mullen teach or suggest each and every element recited in claim 12. See M.P.E.P. § 2143.03. Further, Applicant respectfully submits that the amendment to claim 6 made in the Amendment filed April 10, 2006 does not imply that “‘directly on’ ... [is] redundant and not necessary.”

For at least these reasons, Applicant respectfully submits that there is no suggestion or motivation to modify Fisher using Mullen as proposed and, therefore, that claims 6 and 12 are allowable over the combination of Fisher in view of Mullen and Zhao.

Claims 13, 14 and 16 depend from independent claim 12 and, for at least the reasons given for claim 12, Applicant believes these claims to be allowable over the combination of Fisher in view of Mullen and Zhao.

Claims 11 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fisher in view of Mullen and Zhao and further in view of U.S. Patent No. 6,122,171 issued to Akram, et al. (hereinafter “Akram”).

Applicant submits that the rejection of claim 11 is moot in view of the cancellation of claim 11. Accordingly, Applicant respectfully traverses the rejection of claim 15.

Claim 15 depends from claim 12 and, therefore, includes all of the elements recited in claim 15. As established above, the combination of Fisher in view of Mullen and Zhao fails to render claim 12 obvious. Akram fails to supply any teaching which, when combined with Fisher in view of Mullen and Zhao, would render claim 12 obvious. Thus, for at least the reasons given for claim 12, Applicant believes claim 15 to be allowable over the combination of Fisher in view of Mullen, Zhao, and Akram.

Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2001/0034083 to Coyle, et al. (hereinafter “Coyle”) in view of U.S. Patent No. 5,397,917 issued to Ommen, et al. (hereinafter “Ommen”).

Applicant submits that this rejection is moot in view of the cancellation of claim 6.

Claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Coyle in view of Ommen and further in view of U.S. Patent No. 5,050,040 issued to Gondusky, et al. (hereinafter “Gondusky”).

Applicant submits that this rejection is moot in view of the cancellation of claim 11.

CONCLUSION

For the foregoing reasons, Applicant requests reconsideration and allowance of claims 1-5 and 12-16 of the application as amended. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

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